A MIST-NET STUDY OF MIGRATING BIRDS AT YELLOWKNIFE, NORTHWEST TERRITORIES: SPRING 1985

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ABSTRACT

A mist-net study was undertaken from 2 May to 6 June 1985, to monitor the spring migration of birds at Yellowknife, NWT. Mist-nets were erected for various periods at three locations: Niven Lake, Yellowknife River, and Willow Flats, near downtown Yellowknife. Most of the mist-netting and banding was done at Willow Flats. Eight mist-nets (2 m x 9 m x 30 mm mesh) were erected in natural openings in the shrubbery. The nets were mostly opened at 06:00 hrs and inspected at two-hour intervals until 20:00 hrs. The sampling period was subject to the prevailing weather conditions and the availability of personnel. Most captured birds were identified, sexed (when possible), banded, and released.

Three hundred and thirty-one birds, including 37 species, were mist-netted. Thirty-two (87%) species were passerines and five (13%) were shorebirds. Peaks in migratory activity were observed on 6, 15, and 23-29 May. These peaks did not appear to correspond with peaks in arrival of new species. Banding results and incidental observations revealed that at least 130 species migrated through the Yellowknife area between 11 March and 6 June 1985.

RÉSUMÉ

Une équipe du Service canadien de la faune a mis sur pied une station de baguage d'oiseaux à Yellowknife entre le 2 mai et le 6 juin 1985. Des filets japonais ont été installés sur les berges du lac Niven, à l'embouchure de la rivière Yellowknife, et à Willow Flats, près du centre-ville de Yellowknife. C'est toutefois à Willow Flats que nous avons passé le plus de temps et bagué le plus d'oiseaux. Huit filets japonais (2 m x 9 m x 30 mm de maille) furent déployés dans des clairières entourées de saules et d'aulnes. Dans la plupart des cas, les filets furent ouverts à 06:00 hrs et inspectés à chaque intervalle de 2 heures jusqu'à 20:00 hrs. A quelques reprises, le mauvais temps et le manque de personnel nous ont empêché d'ouvrir les filets. La plupart des oiseaux capturés furent identifiés (espèce et sexe lorsque possible), bagués et relâchés.

Un total de 331 oiseaux représentant 37 espèces furent bagués. Cela inclut 32 espèces (87%) de passereaux et cinq (13%) de limicoles. Trois épisodes d'affluence particulière ont été enregistrés, soit le 6, 15 et 23-29 mai. Toutefois, ces vagues migratoires n'ont pas apparu être nécessairement reliées à l'arrivée de nouvelles espèces. L'ensemble des observations printanières menées par les ornithologues locaux ainsi que les données recueillies pendant le baguage nous révèlent que 130 espèces d'oiseaux ont été observées dans la région de Yellowknife entre le 11 mars et le 6 juin 1985.

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Atmospheric Environment Service (Yellowknife and Edmonton) responded to all our requests regarding weather information.

B. Bromley, R. Butler, N. Dawe, and G. Holroyd, reviewed this report and provided valuable comments and criticisms.

Susan Popowich and Denis Valiquette prepared the illustrations.

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1.0 INTRODUCTION

Several studies have confirmed that the Slave River-western Great Slave Lake-Mackenzie River corridor is a major migration route for migratory birds which breed in the western Canadian Arctic. Salter (1974) recorded 103 species, including 47 passerines, during spring migration at Fort Simpson. He concluded that 23 species, including eight passerines, continue through the Mackenzie Valley to more northern breeding grounds. Salter et al. (1974) conducted a more extensive study involving four locations along the Mackenzie Valley. A total of 162 species, including 66 passerines, were observed. Thompson et al. (1979) concluded that the Slave River Delta is important to migratory birds on a local, regional, national, and international scale. The Slave River Delta is of primary value as a spring and fall migration stop for waterfowl, shorebirds, and passerines. Additional studies (Anon. 1984, Dickson et al., in prep.) support this conclusion.

There has been comparatively little study of spring migration at Yellowknife despite its proximity to this major migration corridor. Since 1955, a total of 37 species including 757 birds have been banded in the Yellowknife area (A. Demers, CWS, pers. comm.) mostly during the summer months. In addition, spring bird migration has been summarized in a checklist of the birds for the Yellowknife area (Bromley and Trauger n.d.).

The objectives of this study were:

1) to document the species composition, and relative abundance of spring migrating birds in the Yellowknife area,

2) to document the chronology of spring migration.

2.0 STUDY AREAS

This study was conducted at Niven Lake, Yellowknife River, and Willow Flats near downtown Yellowknife (Fig. 1). Willow Flats was finally selected as a permanent study area because it is conveniently located and yielded an adequate number of birds while being relatively free from human or other interference. Niven Lake is an eight-hectare lake adjacent to Highway No. 4, at the northern edge of the City of Yellowknife. Historically, it has served as a municipal sewage lagoon. The lake is bordered by sedge (Carex aquatilis) and cattail (Typha latifolia) which merge into stands of willow (Salix sp.) or black spruce (Picea mariana). An abandoned road which runs close to the southern margin of the lake is bordered by dense stands of alder (Alnus crispa). Exposed bedrock is common in the immediate vicinity.

The Yellowknife River site is adjacent to Highway No. 4 at the northwestern extremity of Yellowknife Bay. This shallow extension of the bay is characterized by an extensive sedge meadow around its western and northern margins. The area becomes temporarily flooded as the water level of Great Slave Lake rises in May and June. Over 30 cm of water may cover the wet sedge and grass meadow during this period. Horsetail (Equisetum fluviatile) emerges from open water areas as summer progresses. The sedge meadow, which has been invaded by willows, is surrounded by forest on the adjacent upland areas. Common tree species include aspen (Populus tremuloides), white birch (Betula papyrifera), and alder.

Willow Flats are located in a shallow bay on the western side of Yellowknife Bay, Great Slave Lake. The area is characterized by a broad, wet meadow which has been partially invaded by dense stands of willow and alder. This wetland area provides approximately five hectares of good staging habitat for songbirds, shorebirds and waterfowl within the City of Yellowknife. As the water level of Great Slave Lake rises in May and June, the area becomes temporarily flooded. Over 30 cm of water may cover the wet sedge and grass meadow during that period. A portion of the wetland has been filled

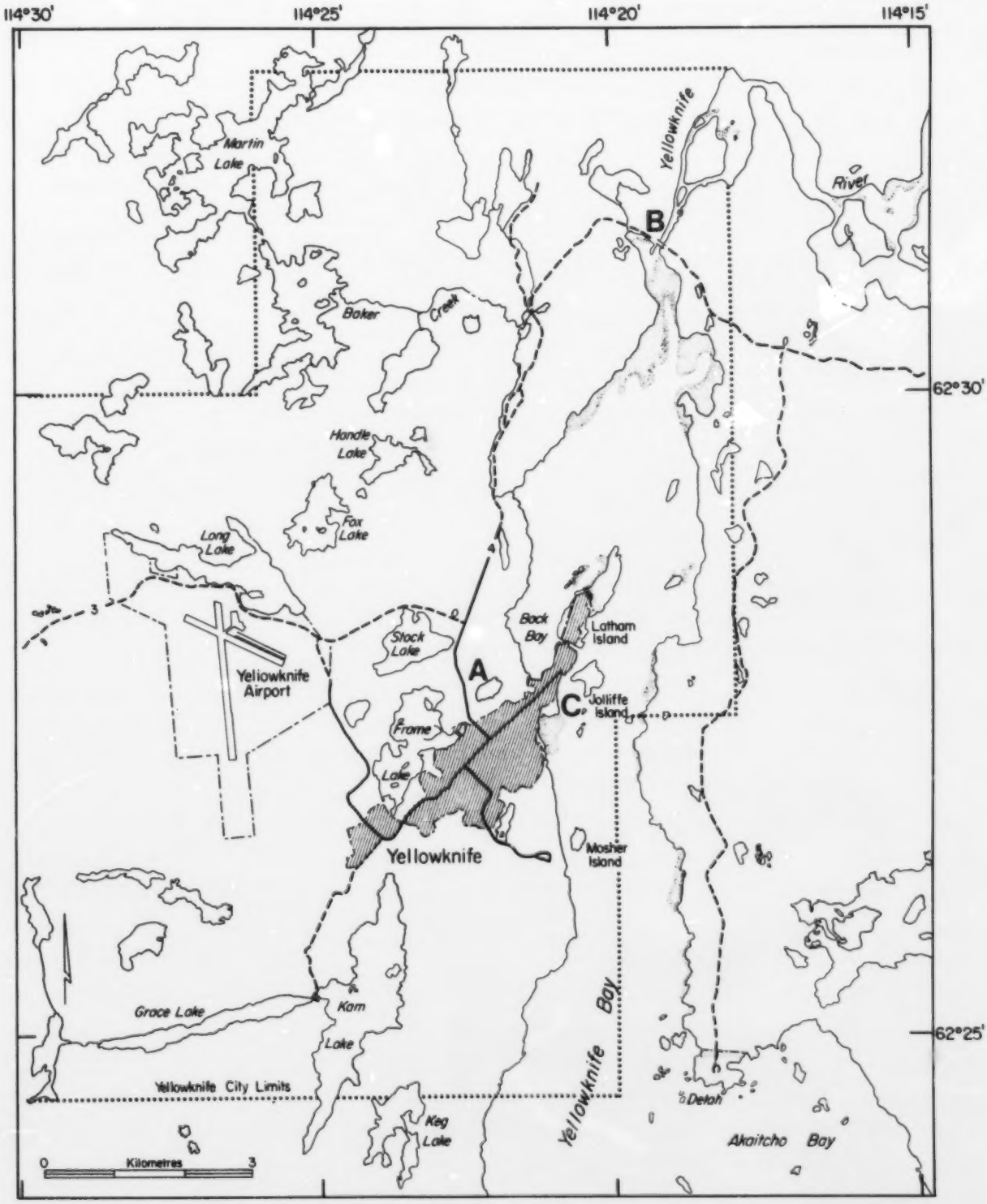

Figure 1. Location of the study areas at Yellowknife, Northwest Territories. A: Niven Lake, B: Yellowknife River, C: Willow Flats.

and developed. A road, a parking area, and houses occur within 100 metres of the mist-nets.

3.0 METHODS

3.1 Field Methods

Mist-netting was conducted from 2 May to 6 June 1985, subject to prevailing weather conditions and the availability of personnel (Appendix 1). The mist-nets were closed during rainy periods. Five mist-nets (2 m x 9 m x 30 mm mesh) were erected at Niven Lake from 2-6 May and six mist-nets were deployed at the Yellowknife River between 7-10 May. The banding operation was then moved to the Willow Flats for the remainder of the study period where eight mist-nets were erected.

At all locations, mist-nets were situated in natural openings in the vegetation. Minimal alteration was made to the existing vegetation. The mist-nets were erected singly or in series wherever the vegetation permitted and were strung from ground level to their maximum height of approximately two metres. Generally, the mist-nets were opened at 06:00 hours and checked, at least every two hours, until 20:00 hours. Occasionally, the nets were maintained for additional periods when personnel were available. The mist-nets were inspected at shorter intervals or closed if the weather threatened the survival of the entrapped birds. Trapped birds were identified, sexed (when possible), aged, banded, and released. The netting effort varied between banding locations and between days at each site (Appendix 1). Banding was conducted during 27 days (298 hours) for a total of 1,580 net-hours. In this report, the term "capture" refers to all birds which were caught and banded, or were caught but escaped, died, or were already banded. All "recaptures" were technically "repeats", or birds captured alive within the same 10 minute grid of longitude and latitude and within the same three-month period in which they were originally banded (Anon. 1984).

3.2 Statistical Methods

In order to determine migratory peaks it was necessary to compensate for three factors which influence mist-net captures: 1) daily differences in the mist-net period (Ralph 1976), 2) mist-net area (i.e. the number of nets used), and 3) the number of hours that the mist-nets were open each day (Appendix 1). An example of these adjustments is provided in Appendix 3.

(1) Because the mist-nets were deployed at different times, on different days (Appendix 1), it was necessary to compensate for diurnal variation in the capture rate (Appendix 2). Accordingly, the mist-net captures, for each two-hour interval of each day, were divided by a correction factor ("C_i") specific to that interval. This correction, in effect, gave all time intervals equal value.

$$\frac{(\text{number of captures in each time interval})}{C_i} = N^c$$

The correction factors ("C_i") were calculated by dividing the mean number of captures, in each time interval (e.g. 6:00 - 8:00), by the mean number of captures in all time intervals combined. Each correction factor therefore reflects the difference in returns between a specific time interval, and the average. These factors were calculated by combining data from 1985 and 1986 (Molozzi *et al.*, in prep.), in order to increase sample sizes and therefore more realisticly estimate patterns in diurnal activity.

$$C_i = \frac{(\text{mean number of captures in each two-hr. interval})}{(\text{mean number of captures in all two-hr. intervals})}$$

This adjustment assumes that diurnal patterns were constant for the duration of the banding period. Three of the twelve time intervals were sampled on less than five occasions (Appendix 2).

(2) The daily captures were standardized to 24 m^2 to compensate for variable mist-net area. Accordingly, the total corrected number of captures (N^c) was multiplied by 24 m^2 divided by the actual mist-net area used that day (i.e. the number of nets used x 18 m^2). This correction assumes that all nets had equal capture rates.

(3) To compensate for daily differences in the amount of time the nets were open, the daily mist-net returns were standardized to "birds captured per 1,000 hours" (Ralph 1976). This was accomplished by multiplying the total corrected number of captures (N^c) each day, by 1,000 hours divided by the actual number of hours the nets were open each day.

$$\text{total number of captures} \times \frac{24\ m^2}{\text{actual area } (m^2)} \times \frac{1{,}000\ \text{hrs}}{\text{actual hours}}$$

The above adjustments were made to "time" rather than "mist-net captures". This was possible because the two are directly related (i.e. captures are expressed in terms of "birds per 1,000 net-hours"). By making adjustments to time, the figures were more repetitive, and fewer calculations were required. This procedure also eliminated the need to assign arbitrary values in place of zeros, which occurred whenever no bird was caught during a time interval.

4.0 RESULTS AND DISCUSSION

4.1 Species Abundance.

Four hundred and eighty-three birds, including 37 species (a Budgerigar that had escaped from a local home brings the total to 38), were mist-netted in the Yellowknife area in 1985 (Table 1). Thirty-two (87%) species were passerines and five (13%) were shorebirds. Habitat characteristics of the study sites and netting techniques favoured the capture of songbirds. Captures of shorebirds

Table 1. Summary of mist-net captures at Yellowknife, Spring 1985.

Species	Captures Banded	Captures Not Banded*	Recaptures	Escapees	Deaths	Total Captures
1-Common Redpoll	41		4			45
2-Lapland Longspur	40		4	2		46
3-Savannah Sparrow	39		35	6	1	81
4-White-crowned Sparrow	30		8	3		41
5-Lincoln's Sparrow	24		27	6	2	59
6-Yellow-rumped Warbler	24		6	1	1	32
7-Yellow Warbler	22	10	11	1		44
8-American Robin	20	2	5			27
9-Dark-eyed Junco	20		3	4	1	28
10-House Sparrow	11					11
11-Red-winged Blackbird	6					6
12-Harris' Sparrow	5		1			6
13-Song Sparrow	4					4
14-Eastern Phoebe	3		2			5
15-European Starling	3					3
16-Orange-crowned Warbler	3					3
17-Blackpoll Warbler	3					3
18-Chipping Sparrow	3			2		5
19-White-throated Sparrow	3					3
20-Lesser Golden-Plover	2					2
21-Least Sandpiper	2					2
22-Boreal Chickadee	2					2
23-Swainson's Thrush	2					2
24-Water Pipit	2		1			3
25-Palm Warbler	2					2
26-American Tree Sparrow	2					2
27-Clay-coloured Sparrow	2					2
28-Swamp Sparrow	2					2
29-Brown-headed Cowbird	2					2
30-Lesser Yellowlegs	1					1
31-Solitary Sandpiper	1					1
32-Common Snipe	1		1			2
33-Alder Flycatcher	1					1
34-Eastern Kingbird	1					1
35-Ruby-crowned Kinglet	1					1
36-Gray-cheeked Thrush	1					1
37-Tree Swallow		1				1
38-Budgerigar		1				1
Total	331	14	108	25	5	483

* due to lack of bands.

were accidental but not surprising in view of their numbers and movements in the nets' vicinity. By comparison, 45 species of passerines and 17 species of shorebirds were seen by bird watchers during the 1985 spring migration in the Yellowknife region.

The five most common species (Common Redpoll, Lapland Longspur, Savannah Sparrow, White-crowned Sparrow, Lincoln's Sparrow) accounted for 53% of the total banded birds and the ten most common species (above species plus: Yellow-rumped Warbler, Yellow Warbler, American Robin, Dark-eyed Junco, House Sparrow) for 82%. These ten species are regular northern breeders, above and below the tree line (Godfrey 1986, Carbyn 1971, Erskine 1977). It was not possible to determine which species were most often observed by local birders because only the earliest records of the season were kept.

The House Sparrow was among the ten most captured species. Its presence was due to nearby urban habitats. This non-native species is restricted to a few communities in southwestern Northwest Territories and southern Yukon (Godfrey 1986). It is a permanent resident in Yellowknife.

Sixty-four birds, representing 12 species, were recaptured 108 times (22% of total captures). Savannah Sparrows were the most commonly recaptured species; sixteen individuals were recaptured a total of 35 times. Twelve Lincoln's Sparrows were recaptured 27 times; one was recaptured a total of seven times (Table 2). Savannah Sparrows, Lincoln's Sparrows, White-crowned Sparrows, Yellow Warblers and American Robins nested near the banding station. Yellow-rumped Warblers, Common Redpolls, Dark-eyed Juncos, and Eastern Phoebes presumably bred in the area. The remaining three species (Lapland Longspur, Harris' Sparrow, and Water Pipit) are migrants. Individuals apparently attempting to establish breeding territories around the banding station accounted for the highest number of recaptures.

Species that were banded in large numbers were not necessarily recaptured in large numbers. Although they were the most frequently

Table 2. Abundance and frequency of recaptured birds at Yellowknife, Spring 1985.

Species	Number of Times Recaptured							Total Birds
	1	2	3	4	5	6	7	
Savannah Sparrow	10	1	1	1	2	1		16
Lincoln's Sparrow	6	4				1	1	12
White-crowned Sparrow	6	1						7
Yellow Warbler	2	3	1					6
Yellow-rumped Warbler	4	1						5
American Robin	5							5
Common Redpoll	4							4
Lapland Longspur	2	1						3
Dark-eyed Junco	3							3
Eastern Phoebe		1						1
Harris' Sparrow	1							1
Water Pipit	1							1

banded species, only four redpolls were recaptured. In southern Canada Redpoll irruptions are apparently tied to heavy seed crops in alders and other plants (Newton 1972, Terres 1980). Whether or not redpoll movements in the Yellowknife area were determied by seed crops, meteorological phenomena, or other factors, could not be determined. However, redpolls moved in en masse and left rapidly; hence many captures but few recaptures. Lapland Longspurs displayed a similar pattern of capture and recapture. Repeated observations indicate that they arrived in flocks at Willow Flats but appeared to prefer adjacent drier habitat. Many were captured but few remained in the nets' immediate vicinity. Banding records indicate that most species staged in the area from two to five days.

The relative abundance of mist-netted species was likely dictated by a variety of factors (e.g. habitat preferences, foraging behaviours, population fluctuations, etc.) which are difficult to assess, given the scope of this project. Species difficult to mist-net are likely underrepresented. Because warblers forage in the shrubbery, and swallows above it, it is not surprising that Yellow Warblers were caught more often than Tree Swallows. Tree Swallows are also known to see and avoid mist-nets (R. Butler, pers. comm.). Species which migrate in dense flocks (e.g. Common Redpoll, Lapland Longspur) appear more likely to be captured in large numbers than species which travel in loose flocks (e.g. Savannah Sparrow), or solitarily (e.g. Eastern Phoebe).

4.2 Chronology of Migration.

Although some spring migrants appear in the Yellowknife area as early as mid-March (Appendix 4), the majority, particularly songbirds, do not arrive until the beginning of May. In 1985, the banding operations began on 1 May.

Three peaks in migratory activity were recorded (Figure 2). The initial peak occurred on 6 May with 597 captures per 1,000

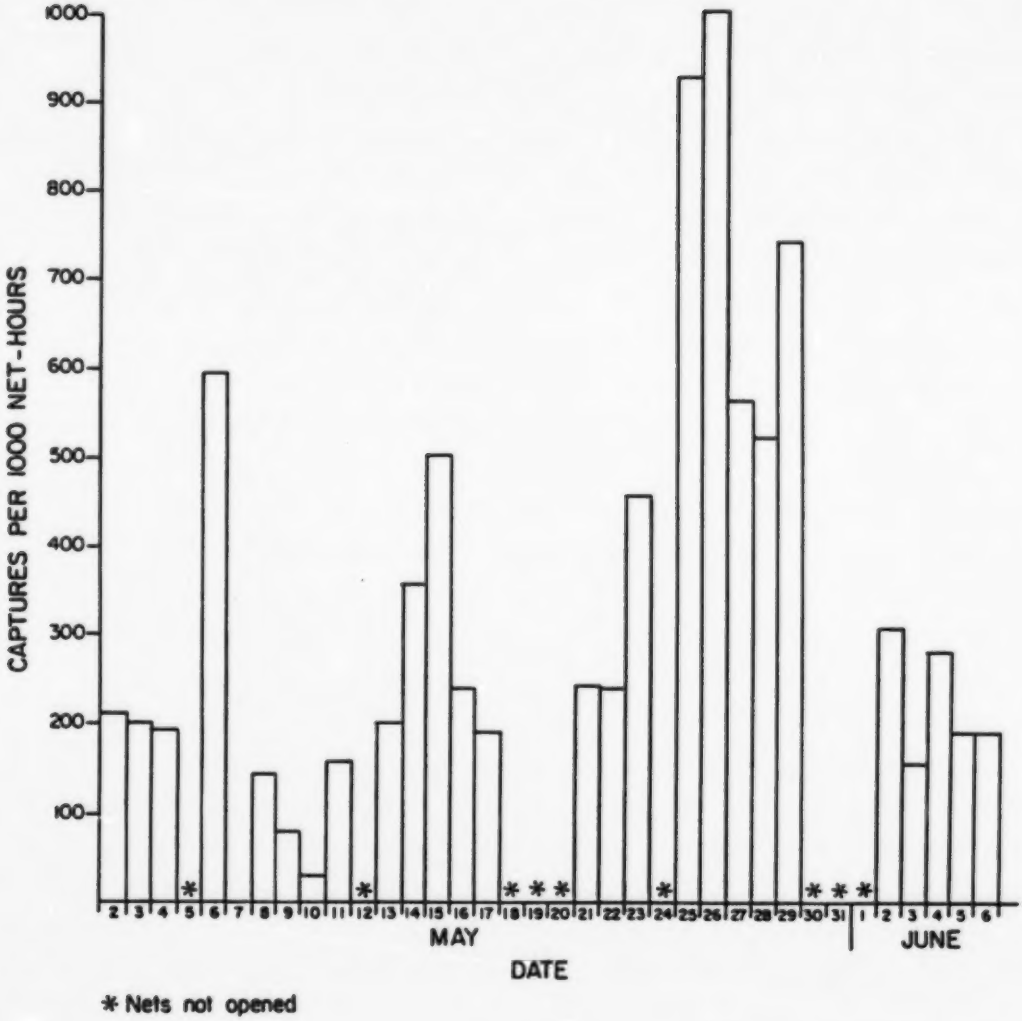

Figure 2. Adjusted daily mist-net captures at Yellowknife, Spring 1985

net-hours. An influx of Dark-eyed Juncos accounted for 28% of of the captures for that day. The significance of this peak is, however, questionable as only two hours of banding occurred on that day. The second peak occurred on 15 May with 504 captures per 1,000 net-hours. Many species, including Savannah Sparrows (37%), Yellow-rumped Warblers (17%), Lincoln's Sparrows (12%) White-crowned Sparrows (12%), and American Robins (7%) contributed to this second peak. Activity levels declined thereafter before reaching their highest level: 1,003 captures per 1,000 net-hours on 26 May. This third peak included the greatest number of species (31) and lasted for seven days (23-29 May). Forty-seven percent of all adjusted captures occurred during this peak. Common Redpolls (20%), Lapland Longspurs (18%), Savannah Sparrows (13%), Lincoln's Sparrows (8%), Yellow Warblers (7%), and Yellow-rumped Warblers (5%) contributed to this peak. All other species were captured in small numbers.

New species arrived on 18 of the 27 banding days. Five new species were caught on 8 and 29 May, and four new species on 21 May (Table 3). The number of new bird species, which arrived each day during spring migration, were determined using both mist-net captures (Table 3) and the records of bird watchers (Appendix 4).

Peaks in migratory activity did not appear to correspond with peaks in new arrivals. Only one new species was banded on 6 May, the first peak of migratory activity, whereas five new species were banded on 8 May, a day of relative inactivity. Again, only one new species was banded on 26 May, the third peak of activity, whereas 5 new species were banded on 29 May, another day of relative inactivity.

Additional information on the chronology of migration was provided by local bird watchers. They observed 130 species from 11 March to 6 June. Twenty-eight species arrived between 11 March and 2 May whereas the remainder were observed during the banding period at a rate of 0 to 12 new species per day. New arrivals were concentrated in the first 10 days of May. Thereafter, peaks of new arrivals occurred on four subsequent days (11, 18, 26 May and 1 June)

Table 3. Chronology of mist-netted species at Yellowknife, Spring 1985.

	May																													June				
Species	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6
Dark-eyed Junco	*	*	*		*		*																				*									
Ruby-crowned Kinglet		*																																		
Common Redpoll		*	*																					*	*	*	*	*								
Boreal Chickadee			*																																	
American Tree Sparrow					*			*		*																										
Savannah Sparrow							*			*		*	*	*	*	*				*	*	*		*	*	*	*	*				*	*	*	*	*
Lincoln's Sparrow							*	*	*			*	*	*	*					*	*	*		*		*	*	*				*	*	*	*	
Yellow-rumped Warbler							*	*				*	*	*	*	*				*	*			*	*	*	*	*							*	*
Song Sparrow							*							*						*						*										
Common Snipe							*																													*
White-crowned Sparrow								*				*	*	*	*	*				*	*			*	*	*		*						*	*	*
Tree Swallow								*																				*								
Budgerigar																																				
Chipping Sparrow													*									*				*	*									
Harris' Sparrow													*	*	*	*																				
Red-winged Blackbird													*													*		*						*		
American Robin														*	*	*								*	*	*		*				*		*	*	*
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Swainson's Thrush																				*								*								
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Lapland Longspur																				*				*	*	*	*	*								
House Sparrow																				*				*	*		*	*								
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Solitary Sandpiper																												*								
Swamp Sparrow																																	*		*	
Alder Flycatcher																																		*		
Number of new species	1	2	1	X	1	0	5	2	0	1	X	0	3	3	2	0	X	X	X	4	0	1	X	1	1	0	3	5	X	X	X	0	1	1	0	0

X: no banding occurred that day.

(Appendix 4).

Banding results were compared with the observations of bird watchers to determine if bird species were mist-netted as they arrived in the Yellowknife area. Twenty-three of the 37 mist-netted species were seen in the area before they were banded. European Starlings were observed 49 days prior to capture, Lesser Yellowlegs, 33 days, and Swamp Sparrow, 14 days. Five species (Yellow-rumped Warbler, Song Sparrow, Yellow Warbler, Orange-crowned Warbler and Eastern Kingbird) were first seen and mist-netted on the same day. Water Pipit was the only migrant caught before it was first observed in the area. Common Redpolls were not considered definable migrants due to the difficulty of differentiating between winter residents and migrants. Finally, five species were banded but never reported in the spring 1985 observations: Brown-headed Cowbird, Blackpoll Warbler, Clay-coloured Sparrow, Solitary Sandpiper and Alder Flycatcher.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 1985 mist-net study of migrating birds at Yellowknife was experimental. The first year of banding has provided valuable information on bird migration in the Yellowknife area. This information complements observations made by local bird watchers during the spring migration. It will help to further refine the regional bird checklist while providing insight on the relative abundance of each species.

As shown by various annual reports on banding in Canada (Wendt, Metras, and Demers, 1986; Hyslop and Demers 1983), few passerines are banded each year in the Northwest Territories. In view of the relatively low number of birds caught during the study, and the scarcity of information on migrating passerines in northern Canada, this study does no more than set the groundwork for further field work. It is therefore recommended that:

1) the Yellowknife mist-net study continue for at least two more years,

2) the banding operations be moved permanently to Willow Flats, an area that is easily accessible and provides good habitat,

3) mist-nets be opened during as many days as possible, during the banding period, to minimize information gaps between peaks of migratory activity,

4) the number of mist-nets used as well as other variables be kept as constant as possible, to eliminate the need for statistical manipulation of the data,

5) more 24-hour shifts be completed to determine the level of bird activity throughout the day.

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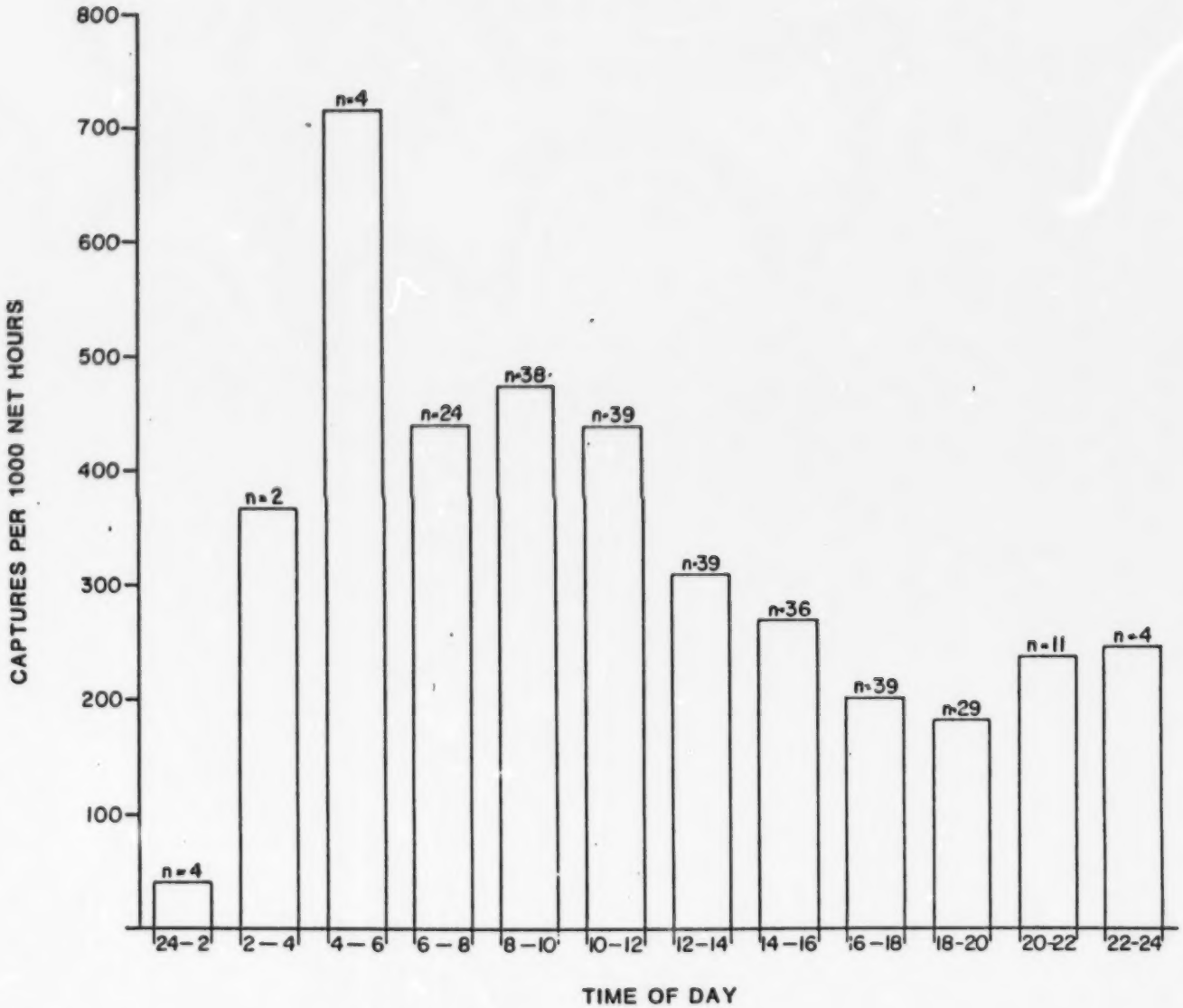
Appendix 1. Daily mist-netting effort at Yellowknife, Spring 1985 (number of nets open per two-hour period).

	May																														June				
Hours	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6
24:00-02:00																					8															
02:00-04:00																					8															
04:00-06:00																					8															
06:00-08:00	5	5	5		5	3	6	6		2		8		8	8	8				4		4				8	8						8			
08:00-10:00	5	5	5			6	6	6	6	2		8	8	8	8	8				8						8	8	8					8		8	8
10:00-12:00	5	5	5			6	6	6	6	2		8	8	8	8	8				8				6		8	8	8				8	8		8	8
12:00-14:00	5	5				6	6	6	6	2		8	8	8	8	8				8				8		8	8	8				8	8	8	8	8
14:00-16:00	5	5				6	6	6		2		8	8	8	8	8				8				8	6	8	8	8				8	8	8	8	8
16:00-18:00	5					6	6	6		8		8	8	8	8	8				8					8	8	8	8				8	8	8	8	8
18:00-20:00	5						6	6				8	8	8	8					8					8	8	8	8				8	8	8	8	
20:00-22:00																				8							8	8				8		8		
22:00-24:00																				8								8								

2 May 1985: nets at Niven Lake

7 May 1985: nets moved to Yellowknife River

11 May 1985: nets moved to Willow Flats



Appendix 2. Diurnal patterns in mist-net captures at Yellowknife, Spring 1985 and 1986

Appendix 3. Determination of adjusted daily captures for 25 May, 1985

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On 25 May the nets were open from 10:00 to 16:00, and a total of 31 birds were captured.

Step 1: Correction for diurnal variation in capture rate.

Time interval	number of captures (n)	correction factor (C)	number of captures corrected (n ÷ C)
00:00-02:00	/	0.13	
02:00-04:00	/	1.13	
04:00-06:00	/	2.19	
06:00-08:00	/	1.34	
08:00-10:00	/	1.45	
10:00-12:00	4	1.34	2.99
12:00-14:00	9	0.95	9.47
14:00-16:00	18	0.83	21.69
16:00-18:00	/	0.62	
18:00-20:00	/	0.42	
20:00-22:00	/	0.73	
22:00-00:00	/	0.75	
	Total corrected number of captures:		34.15

Appendix 3. continued.

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<u>Steps 2 & 3</u>: Corrections for mist-net area and time.

$$\text{total number of captures} \times \frac{24\ m^2}{\text{actual area } (m^2)} \times \frac{1{,}000\ \text{hrs}}{\text{actual hours}}$$

$$= 34.15 \times \frac{24\ m^2}{8 \times 18\ m^2} \times \frac{1{,}000\ \text{hrs}}{6\ \text{hrs}}$$

= 948.61 captures per 1,000 net-hours

Appendix 4. First observation of migrating species at Yellowknife, Spring 1985.

	March		April																				May					
Species	11	29	7	8	9	12	13	14	19	20	21	22	23	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12
Golden Eagle	X																													
Hairy Woodpecker*		X																												
Pine Grosbeak*		X																												
European Starling*			X																											
Bald Eagle			X																											
Bohemian Waxwing*				X																										
Northern Hawk-Owl*					X																									
Wilson's Phalarope						X																								
Common Merganser							X																							
Snow Bunting								X																						
Mountain Bluebird								X																						
American Crow								X																						
Dark-eyed Junco									X																					
Rough-legged Hawk										X																				
Northern Shrike										X																				
Red-tailed Hawk										X																				
Willow Ptarmigan*											X																			
Short-eared Owl												X																		
American Kestrel													X																	
Lesser Yellowlegs														X																
Herring Gull														X																
Ruby-crowned Kinglet															X															
American Tree Sparrow																X														
Red-winged Blackbird																	X													
Barn Swallow																	X													
Northern Flicker																		X												
Tundra Swan																		X												
Mallard																		X												
Tree Swallow																			X											
American Wigeon																				X										
Northern Harrier																				X										
Sharp-shinned Hawk																				X										
American Robin																				X										
Common Grackle																				X										
Number of new species:	1	2	2	1	1	1	1	3	1	3	1	1	1	1	2	1	1	3	1	5										

Appendix 4. continued.

Species	May 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 1	2	3
Sandhill Crane	X																															
Killdeer	X																															
Arctic Tern	X																															
White-crowned Sparrow	X																															
Boreal Chickadee*		X																														
Green-winged Teal		X																														
Northern Pintail		X																														
Bufflehead		X																														
Common Snipe		X																														
Chipping Sparrow		X																														
Lincoln's Sparrow		X																														
Rusty Blackbird		X																														
Common Redpoll*		X																														
Horned Grebe			X																													
Blue-winged Teal			X																													
Canvasback			X																													
Ring-necked Duck			X																													
Lesser Scaup			X																													
American Coot			X																													
New Gull				X																												
Savannah Sparrow					X																											
Harris' Sparrow					X																											
Northern Shoveler						X																										
Common Goldeneye						X																										
Red-breasted Merganser						X																										
Greater Yellowlegs						X																										
Spotted Sandpiper						X																										
Bonaparte's Gull						X																										
California Gull						X																										
Yellow-bellied Sapsucker						X																										
Hermit Thrush						X																										
Yellow-rumped Warbler						X																										
Black-and-white Warbler						X																										
Song Sparrow						X																										
Number of new species:	4	9	6	1	2	12																										

Appendix 4. continued.

Species	May 9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 1	2	3	4	5	6	7	8	9
Canada Goose	X																															
Belted Kingfisher	X																															
Eastern Phoebe	X																															
Swainson's Thrush	X																															
Red-necked Grebe	X																															
Ruddy Duck		X																														
White-throated Sparrow		X																														
Osprey			X																													
Palm Warbler			X																													
Lesser Snow Goose				X																												
Peregrine Falcon				X																												
Great Horned Owl*				X																												
Gray Jay*				X																												
Gray-cheeked Thrush				X																												
Red-throated Loon					X																											
Common Nighthawk						X																										
Yellow Warbler							X																									
Pacific Loon							X																									
Greater White-fronted Goose									X																							
Surf Scoter									X																							
Oldsquaw										X																						
White-winged Scoter										X																						
Sora										X																						
Lesser Golden-Plover										X																						
Swamp Sparrow										X																						
Horned Lark												X																				
Lapland Longspur												X																				
Caspian Tern													X																			
Veery													X																			
Orange-crowned Warbler													X																			
Willet															X																	
Semipalmated Sandpiper																X																
Mourning Dove																	X															
Common Loon																		X														
Number of new species:	5	2	2	5	1	1	2	0	2	5	0	2	3	0	1	1	1	1														

Appendix 4. continued.

Species	May 9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 1	2	3	4	5	6	7	8	9
Ruddy Turnstone																		x														
Least Sandpiper																		x														
Stilt Sandpiper																		x														
Red Phalarope																		x														
Western Wood-Pewee																		x														
Yellow-bellied Flycatcher																		x														
Water Pipit																			x													
Sharp-tailed Grouse*																			x													
Pectoral Sandpiper																			x													
Eastern Kingbird																					x											
Hooded Merganser																					x											
Black-bellied Plover																						x										
Black Tern																						x										
Glaucous Gull																							x									
Semipalmated Plover																								x								
Red Knot																								x								
Ring-billed Gull																								x								
Common Tern																								x								
Cliff Swallow																								x								
Common Raven*																								x								
Parasitic Jaeger																													x			
Number of new species:																		6	3	0	2	2	1	6	0	0	0	0	1			

* permanent resident or may overwinter in the area

Appendix 5. Scientific, English and French names of bird species mist-netted at Yellowknife, Spring 1985.

Scientific Name	English Name*	French Name**
Pluvialis dominica	Lesser Golden-Plover	Pluvier doré d'Amérique
Tringa flavipes	Lesser Yellowlegs	Petit chevalier à pattes jaunes
Tringa solitaria	Solitary Sandpiper	Chevalier solitaire
Calidris minutilla	Least Sandpiper	Bécasseau minuscule
Gallinago gallinago	Common Snipe	Bécassine des marais
Melopsittacus undulatus	Budgerigar	Perruche ondulée***
Empidonax alnorum	Alder Flycatcher	Moucherolle des aulnes
Sayornis phoebe	Eastern Phoebe	Moucherolle phébi
Tachycineta bicolor	Tree Swallow	Hirondelle bicolore
Parus hudsonicus	Boreal Chickadee	Mésange à tête noire
Regulus calendula	Ruby-crowned Kinglet	Roitelet à couronne rubis
Catharus minimus	Gray-cheeked Thrush	Grive à joues grises
Catharus ustulatus	Swainson's Thrush	Grive à dos olive
Turdus migratorius	American Robin	Merle d'Amérique
Anthus spinoletta	Water Pipit	Pipit commun
Sturnus vulgaris	European Starling	Étourneau sansonnet
Vermivora celata	Orange-crowned Warbler	Fauvette verdâtre
Dendroica petochia	Yellow Warbler	Fauvette jaune
Dendroica coronata	Yellow-rumped Warbler	Fauvette à croupion jaune
Dendroica palmarum	Palm Warbler	Fauvette à couronne rousse
Dendroica striata	Blackpoll Warbler	Fauvette rayée
Spizella arborea	American Tree Sparrow	Pinson hudsonien
Spizella passerina	Chipping Sparrow	Pinson familier
Spizella pallida	Clay-coloured Sparrow	Pinson des plaines
Passerculus sandwichensis	Savannah Sparrow	Pinson des prés
Melospiza melodia	Song Sparrow	Pinson chanteur
Melospiza lincolnii	Lincoln's Sparrow	Pinson de Lincoln
Melospiza georgiana	Swamp Sparrow	Pinson des marais
Zonotrichia albicollis	White-throated Sparrow	Pinson à gorge blanche
Zonotrichia leucothris	White-crowned Sparrow	Pinson à couronne blanche
Zonotrichia querula	Harris' Sparrow	Pinson à face noire
Junco hyemalis	Dark-eyed Junco	Junco ardoisé
Calcarius lapponicus	Lapland Longspur	Bruant lapon
Agelaius phoenicus	Red-winged Blackbird	Carouge à épaulettes
Molothrus ater	Brown-headed Cowbird	Vacher à tête brune
Carduelis flammea	Common Redpoll	Sizerin à tête rouge
Passer domesticus	House Sparrow	Moineau domestique

* English names as published in the thirty-fifth supplement to the American Ornithologists' Union check-list of North American birds.

** French names as published by la Société zoologique du Québec and used by Canadian Wildlife Service (1980).

*** Budgerigar escaped from a local household.

Appendix 6. A band recovery from the Lesser Antilles.

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A Lesser Yellowlegs (band # 0912-57019) banded at Willow Flats (Yellowknife), on 28 May 1985, was shot and killed at Le Vauclin, southeast Martinique (French West Indies), on 8 May 1986. The recovery was reported by the finder, a resident of the island. The bird's sex was recorded as unknown, and its age as AHY (after hatching year), as they were reported one year before at the Yellowknife banding station. This was the only Lesser Yellowlegs banded in Yellowknife in 1985.